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2 June 1980

East Europe Report

ECONOMIC AND INDUSTRIAL AFFAIRS

(FOUO 4/80)

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EAST EUROPE REPORT

ECONOMIC AND INDUSTRIAL AFFAIRS

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CONTENTS

AGRICULTURAL APPLICATION OF PESTICIDES AGAINST RODENTS

Bratislava AGROCHEMIA in Czech Mar 80 issue No 3 pp 84-85

[Article by Ing. Eliska Vanurova, Central Agricultural Control and Testing Institute-OKOR (District Commission Official), Brno: "Evaluation of Pesticides Approved and Perspectives of New Preparations." From the journal ZPRAVY, UKZUZ, Brno, 20 (3), 1979, p 32]

[Text] Successful chemical protection of plants from field mice presupposes among other things, the correct choice of preparation and of the means of application. This choice is, however, rather limited. It is perplexing that from the rather large group of pesticides which are toxic to warm-blooded animals, only a very few are generally effective against field mice.

In the CSSR, for example, the only effective ones are the products releasing hydrogen phosphide, Endrin and Crimidin; in the GDR, Chlorfacinon, Camphechlor and products releasing hydrogen phosphide; in the FRG, Crimidin, Camphechlor, products releasing hydrogen phosphide and Endrin; in Austria, Endrin, thalium phosphate, Crimidin and products releasing hydrogen phosphide; in the USSR, Gliftor and products releasing hydrogen phosphide; and in France, Crimidin and products releasing hydrogen phosphide.

This phenomenon may be explained by the fact that the requirements for preparations designed to kill field mice are rather specific. They are:

1. High toxicity for field mice.
2. Final product form which will not endanger man, useful fauna, game animals and birds.
3. Harmlessness for myophages.
4. Suitable decomposition rate to exclude the possibility of harmful contamination of the soil and crops (exceeding 1 month). Until recently Endrin and preparations releasing hydrogen phosphide have found the widest application.

Endrin is the only product registered in the CSSR which can be used against field mice in a form which can be sprayed on the affected cultivated area with land machinery.

Area spraying of field cultures has some advantages over the use of lures. With area spraying of growths, there is a greater probability of contact of the field mice with the preparations. The rodent is killed directly by the chemically treated feed or indirectly when cleaning its contaminated coat. Hence, the microtoxil effect of the area spraying of cultures is usually more reliable than the effects of set lures. The agricultural practice needs, and rightly demands, spray products against rodents, even though sprays have some shortcomings. They are more dangerous to man than lure preparations because one cannot avoid handling concentrates. The great majority of rodenticides therefore cannot be applied in the form of sprays.

Products applied in the form of area sprays infest the growths more intensively than strategically placed lures. It is very difficult, however, to determine the share of the effective substance that missed the targeted organism and could bring about adverse secondary effects. By maintaining the conditions set for work with toxic substances during their application one might prevent the secondary adverse effects. In socialist mass production, these conditions can be maintained. Hence, only those objections against Endrin which concern its specific action, are justified. The specific action of Endrin, however, has not yet been completely clarified.

We are also searching assiduously for other pesticides against field rodents which would be applicable in the form of area sprays. For this purpose we were verifying the toxic effectiveness of Scillioroside, endosulphan, Camphechlor and Carbofuran. None of the pesticides listed was found effective against the field mouse.

Monocrotofos in the form of a water soluble concentrate (Nuvacron 40 WSC Ciba-Geigy Co.) offers some hope. In field experiments made last year, with an application of 800 cc of effective substance per hectare, this product showed an effectiveness against the field mouse of over 90 percent (1).

Monocrotofos (0,0-dimethyl-0-(1-methyl-2-N-methylcarbamoyl)-vinyl phosphate) has been known since 1965. It is used as an insecticide and acaricide in the FRG, in France, and in the U.S.; in the CSSR it has been used until recently against hop aphids on hops, and now only against sucking and chewing pests on ornamental plants. According to the documentation of the producer (2) it acts as an ingestive and, to a lesser degree, contact poison. It is considerably toxic both for birds and fish. It is soluble in water and systemic in plants. It is not persistent. The half-time decay plexus ca. 7 days (3). Its toxicity for warm-blooded animals is at the level of other microtocides (LD_{50} p.o. ac. (orally before meals) for rats is 20 mg/kg; LD_{50} percutaneously for rabbits is 342 mg/kg) (4).

We are planning to retest Monocrotofos against field mice in additional field experiments. We do not know at the present time the secondary effects of this product on useful fauna and game animals. It is not used abroad as a pesticide.

At the present there is no other pesticide known which promises successful use against field mice in the form of area sprays.

Products which release hydrogen phosphide are used as pesticides in practically every European country despite their certain shortcomings:

1. The toxicity of hydrogen phosphide against the field mice is lower than the toxicity of other compounds, such as Crimidin, for example (according to the tests of the Institute for Vertebrate Research of the Czechoslovak Academy of Sciences).

2. The consumption of sublethal doses gives rise to a repulsion reflex in the field rodent.

3. In view of the fact that the effective substance is in the gaseous group, greater care is necessary during the production, storing and handling of the products releasing hydrogen phosphide. Many of them can be handled only by specially trained workers. Preparations releasing hydrogen phosphide are produced only in the form of fumigants, tablets, granules, traps and lures.

Fumigants, tablets and granules which release this gas and lures in the form of poisoned grain cannot be applied otherwise than into the burrows. The placing of the product in the burrows, however, is quite uneconomic, in view of the labor and time required. So far it cannot be mechanized. From this aspect, lures, especially in the form of granules, have better prospects. The lures are placed in planned point patterns. The consumption of the effective substance per area unit, and thus the contamination of the environment, is lesser than in the case of spraying. Even the application of lures still leaves much unresolved, however. Lures placed in a colony are usually accepted quantitatively by the field mice. Outside the colony they remain unnoticed. What is to be the distribution of granules in such cases, and in various cultures, for example, parks? Is it possible to leave unprotected strips or enclaves? Is a partial treatment of the ground sufficient in some cases? If so, when and how large should the areas be?

The question of the stability of lures is not yet resolved either: how long are they to remain attractive and effective?

Lure preparations are dangerous for useful fauna, especially the birds. They must therefore be inconspicuous and must be dispersed exclusively in the cover growths, to escape the attention of birds. They must not be placed on bare ground or in little clusters so as not to trigger the so-called pecking reflex of birds and be eaten by them. From this aspect, lures in the form of granules up to 3 mm in size appear to be the most suitable. They make possible the highest coverage of the treated area with the product and thus a higher probability of rodent contact with the lure. It can be expected that granules of the cited size, compared to larger granules, will more easily escape the attention of game animals and birds.

No suitable equipment is yet available, however, for application of microtocides. Substitute emergency application mechanisms--fertilizer spreaders on land machinery and planes, or sowing machinery--represent only an improvisation forced by circumstances. The agrotechnical conditions for the scattering of granular lures are not extant at present and ATP (agrotechnical conditions?) valid for spreading of fertilizers, adjusted for granular lures, are not applicable in view of the mobility of the field mouse.

When the products are applied with land machinery on field cultures, the direction orientation of the tractor operator is difficult, inasmuch as the tracks of the path of the machinery are not clear.

Stutox, a lure releasing hydrogen phosphide, was developed in recent years in the CSSR. Grazin, whose shortcomings are generally known, was the predecessor of Stutox. Even Stutox, however, has some serious defects. One of them is unquestionably the short life of the product. The granules are highly hydrophilic. In a humid environment they readily absorb moisture, they lose their attractance and decompose prematurely. We believe that further development of the poison lure Stutox should be directed, beside an increase in stability, to diminution of the granules to achieve a higher coverage of the treated area with the product. At the same time such a content of the effective substance must be maintained in the product as would reliably insure the death of the rodent after ingestion of a single granule, so that a repulsion reflex would not arise. Such a product could fully replace the imported Arrex M Koeder klein.

For the future, one must consider granular microtocides against field mice based on other compounds, more effective than hydrogen phosphide; for example, those based on Crimidin or Dimefox. One must avoid the one-sided application of lures of a single type of the effective substance. Rodents may stop accepting them or can adapt to them.

It is amazing that Crimidin, one of the oldest known rodenticides, has not lost its importance to date. In the given circumstances it is not easily available, however, for our agricultural practice. It is imported from the capitalistic countries.

Castrix Pellets, with the Crimidin base, from the aspect of attractance, suitable stability and reliable effect represent at the present a model microtocide for domestic development.

Employment possibilities of the so-called anticoagulants merit clarification for protection of agricultural cultures against field rodents. Anticoagulants block the action of vitamin K. Vitamin K is their antidote. Field rodents, definite herbivores, are supplied adequately with vitamin K for the most part of the year. They receive it from green feed and intestinal microflora.

Lures based on Chlorfacinon are approved against field rodents in the GDR.

In the CSSR, we have experience so far with three compounds of this type: Chlorfacinon (Delicia chlorfacinon granule, VEB Delicia, Delitsch), tested under field conditions in 1975; Difenacoum (Ratac, ICI Plant Protection) tested in 1977; and Brodifacoum (PP 581 of the same company) tested in 1978. The first two compounds were not found effective when applied in the fall. It is probable that when these compounds are applied in the spring season, when the field mouse is weakened after hibernation and when it suffers from lack of feed, the products on the basis of the listed anticoagulants will be essentially more effective. The anticoagulant Brodifacoum is noteworthy.

In experiments of the Central Agricultural Control and Testing Institute-OKOR (1) it acted slowly but reliably, and even in the growths of alfalfa, where the rodent was adequately supplied with vitamin K. This shows that suitable anticoagulants with a sufficiently attractive agent may be used successfully against rodents.

Testing of the effectiveness of products against the field mouse under field conditions is very time consuming and costly. In some years, when the prevalence of rodents is relatively low, it is not feasible.

It should be the final, even though quite indispensable phase of the testing of these preparations. It should be preceded by a relatively detailed study of the mechanisms of the effect of the pesticides on individuals of the institute breeds of the field mouse. For this reason we welcome with satisfaction the expanding cooperation of Central Agricultural Control and Testing Institute with the workers of the Czechoslovak Academy of Sciences in establishing the toxicologic profiles of all accessible preparations coming into consideration as protection against the field mouse.

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CZECHOSLOVAKIA

CENTRALIZED HEATING SYSTEMS IN CSSR VIEWED

Prague ENERGETIKA in Czech No 2, 1980 pp 49-54

[Article by Engineer Miroslav Kubin, ScC, Czechoslovak Power Plants, Concern, General Administration, Prague: "Development of Centralized Heat Supply and Planned Urbanization of the CSR"]

[Text] By its decision No 130/79 the government of the CSR adopted the principles for a long-range power-engineering policy in the sector of construction and operations of installations supplying heat to our national economy and to our population.

By generating heat in combination with electric power the centralized heat supply distinctly helps save the primary resources, makes it possible to use low-grade coal in the power-engineering industry with identical ecological effects, and contributes in a positive way to advanced urbanization and territorial rationalization.

Management of Heat Supply for National Economy and Population

The level of the management of heat supply is affected to a considerable degree by the fact that while the processes of mining, production and transport of fuels and power in the system of solid fuels, thermal energy, fuel gases for the system of electrification and solid fuel system are being planned and studied to an appropriate depth, the situation is different as concerns the exploitation of fuel and power (and a reverse reflection of effects from that area into the preceding stages of power engineering processes) where in principle the current methods of planning and management of that area are lagging behind current needs and opportunities.

Common symptoms in those systems and their correlation with the options for the most preferable choice of power carriers provide the preconditions for improved management of the power system as a whole.

The current situation demands unconditionally a comprehensive revision and innovation of decrees and legislative and other regulations, in order to exert more substantial effect on conceptual control, problems in investment capital pooling, control of operations and maintenance of thermal resources as well as of primary and secondary networks, and control of thermal energy and its balance. Governmental decrees (No 80/57, No 1088/60, 19/67, etc.), and in particular, decree No 38/1963 of the Collection, containing the principles of organization and operations in installations for generation and distribution of heat, stopped arbitrary technological and economic approaches to the problems in the planned heat supply, nevertheless, there has not been any comprehensive legal norm at all. It was not until governmental decision No 130/79 "On Principles of Long-Range Power Policy in the Sector of Construction and Operation of Installations for Heat Supply to National Economy and Population" that a systematic attempt in that direction was made.

Heat Supply As a Problem of National Economy

Heat holds the main share in the consumption of the primary resources. While electric power shares about 25 percent of the final consumption of utility power, about 40 percent is used for heating of premises and service water (low-potential heat) and about 35 percent for technological heat and transportation.

The total production of thermal energy, projected on the level of 1980, will amount to 517,865 TU. Ministries will consume 25,243,000 tmp for generation of thermal energy, while the supplies of thermal energy for heating of housing and nonproductive areas in all of the ministries represent 86,047 TU, which is 16.6 percent of the total production; the supplied thermal energy represents 4,195,000 tmp.

The most important of the ministries supplying heat for housing and nonproduction areas, the FMPE [Federal Ministry of Fuels and Power], supplies about 75 percent of thermal energy at the 1980 level.

The presumed growth of the generation of thermal power, not including the generation of electric power, and the share of supplies for heating of housing and nonproduction areas appear in Table 1 (share of the FMPE).

Tab. 1

(1) Rok	1975	1980	1985
(2) Výroba tepla z paliv [TJ]	107 285	140 307	180 624
(3) z toho pro byty a nevýrobní sféru (4) [TJ]	53 807	69 350	96 740
(5) % z celé výroby	50,2	49,4	51

Table 1.

Key:
1 - Year
2 - Generation of heat from fuels (TU)
3 - Of which for housing and non-production areas
4 - TU
5 - Percent of total production

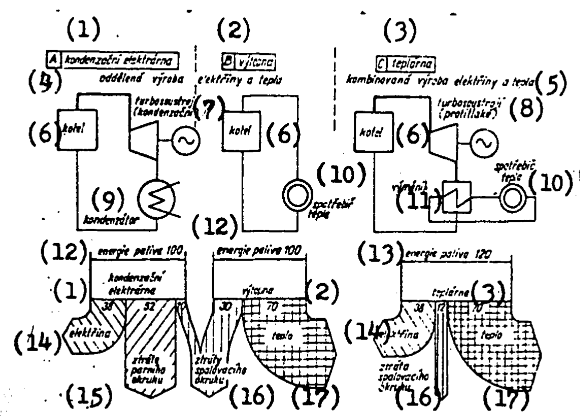
Characteristics of the development, generation and suppiies of thermal energy in other ministries are presented in Table 2.

Tab. 2

(1) Rok	1975	1980	1985	1990
(2) Výroba tepla z paliv [TJ]	317 462	377 503	434 958	503 010
(3) z toho pro byty a nevýrobní sféru [TJ]	14 891	21 989	25 565	27 968
(4) % z celé výroby	4,7	5	5,9	5,5

Table 2.

Key:
1 - Year
2 - Generation of heat from fuels (TU)
3 - Of which for housing and nonproduction areas (TU)
4 - Percent of total production



Obr. 1. Porovnání energetické náročnosti oddělené a kombinované výroby elektrické energie a tepla při stejném užitném efektu

Figure 1. Comparison of Demand on Power in Separate and Combined Generation of Electric Power and Heat With Identical Utility Effect

Key:

1 - A - Condensing power plant
2 - B - Heating Plant
3 - C - District heating plant
4 - Separate generation of electric power and heat
5 - Combined generation of electric power and heat
6 - Boiler
7 - Turbosets (condensing)
8 - Turbosets (counter pressure)
9 - Condenser
10 - Heat consumer
11 - Exchanger
12 - Fuel energy 100
13 - Fuel energy 120
14 - Electric power
15 - Loss of steam cycle
16 - Losses of combustion cycle
17 - Heat

From their comparison it follows that the total production in other ministries is nearly three times higher, while the supplies for heating of nonproduction and housing areas amount to roughly one third of the supply of the FMPE.

As concerns fuel resources, the situation demands that generation of heat in the newly built capacities be planned essentially on the basis of brown coal and natural gas alone. At the same time, it will be necessary to develop and introduce measures that will make it possible to take the advantage of the construction of nuclear power plants for the conversion of some of the condensing power plants into thermal plants, and also to reduce generation of power from fuel oils, so as to release the necessary minimum of such fuels for the development of thermal engineering.

The share of new housing units heated by the centralized system (CZT) must be increased and the opportunities for a higher share of electric power in heating must be taken into consideration. This is connected with appropriate measures in the machine-engineering ministries supplying boilers, heaters, control equipment, etc.

Central Heat Supply

The CZT may be introduced either by heating plants, i.e., from boiler units with facilities situated on the outskirts of housing developments, towns, etc., or by power and heating plants, where the steam produced in boilers is utilized first (higher parameters of pressure, heat) for generation of power in turbosets (either counter pressure or condensing extraction TG), while the low potential heat (low heat, waste) is used for heating. As it follows from Figure 1, only approximately 38 percent of energy supplied from condensation in the process of power generation is transformed into electric power, and the rest is waste heat of 30 to 40° C. This heat cannot be normally utilized, and therefore, it is diffused from cooling towers into the environment (heat load in the atmosphere or water heated by through-flow cooling).

However, if we utilize about 20 percent more of the primary power (crude oil, mazut, coal), then while maintaining the same level of generation of electric power, 90 per cent of the temperature of the waste heat may be utilized (and further heated, if necessary) for heating of housing units; thus, 3 or 4 times more usable heat may be obtained for heating purposes.

Furthermore, it should be mentioned that the above-quoted 38 percent of the supplied energy transformed into electric power must be considered as the maximum achievable in operations using high-grade fuels (liquid or gas). In our conditions oriented to low-grade fossil fuels the above-mentioned ceiling of transformation is about 33 percent, whereby the advantages of the combined cycle are further emphasized.

Advantages of Centralized Heat Supply With the Use of Combined Generation of Electric Power and Heat

1. Reduction of total consumption of fuels by increased share of the combined generation of heat and power by 25 to 30 percent.

2. Opportunity to utilize low-grade domestic power fuels.

3. Lower import of high-grade fuels.

4. Option to install nuclear sources of heat at a later date. From this point of view, the construction of a regional system may be considered, unlike isolated systems, as pre-investment for the future types of heat supply whose construction will begin approximately in 1990. We must realize that nuclear sources may be economically installed only for high consumption of heat of 600-1200 MW thermal capacity, and that then the investment in thermal distribution cannot be eliminated; any conversion of one type of heat supply into another in the future will be extremely difficult in terms of time, technology, and construction.

5. Potential utilization of the existing condensing power plants by converting them into counter pressure and extraction sets for heat supply, in view of the fact that the radius of heat supply increases with the already achieved technological objectives (a feasible radius is 20 to 30 km). The electric plants which employ cadres of power engineers will have to be eliminated in the future or adjusted to higher parameters (which is extremely demanding in terms of technology and investment). Thus, another problem concerning better utilization of the available thermal sources can be resolved.

6. Savings of labor - the staff in combined generation is 30 to 40 percent lower than in production generation electric power and heat in separate operations, and here the effect of a worker released to the sphere of production must be considered in calculations of economic efficiency (not merely his wages).

7. Reduced emissions (solid and gas exhalations) as a result of the total reduced consumption of fuels as well as a result of potential utilization of highly efficient separators.

8. Reduction of emissions (fly ash and concentration of gases exhaled into lower layers of air above the ground) by installation of the heat source outside the center, as well as by tall chimneys.

9. Secondary reduction of exhalations as a result of fewer fuel transports, removal of ashes, etc.

10. Reduction of thermal charges in the atmosphere (environment).

11. Lower demands on the mining, machine engineering, and construction industries, in terms of production, construction and assembly capacities.

12. Savings of the space required for the construction of facilities in heated buildings (boiler, chimney, fuel storage, etc., are eliminated).

13. Safe operations (fires, explosions--gas, oil); the risk that oil may penetrate into underground waters is eliminated.

14. Better comfort and inner well-being.

15. Lower load on municipal transportation.

16. Lower demands on the development, deliveries, and license equipment.

17. Opportunities for cooperation of the industry with national councils in preparation of a joint concept, for example, in modification of old boiler capacities that cannot be converted to low-grade fuels in the future.

18. Potential technological installations for heat consumption control.

19. Lower maintenance costs.

20. Standardization of resources (as in the USSR, GDR) in uniform series.

Naturally, this means considerable demands on planning preparations, precise schedules for construction works, including the use of reliminary resources, regulation of fuel systems, parallel cooperation, and necessary construction of supplementary electric capacities, including conversion of the existing electric power plants into thermal plants. Certain factors in the value analysis, or as the case may be, in the determination of the table of guidelines remain neutral (expropriation of agricultural lands, dumping of ashes, investments required). Transportation losses for transmission appear no worse than in other media (electricity, gas 5-8 percent).

Economic efficiency calculated according to Regulation No 11 of the FMTIR [Federal Ministry of Technological and Investment Development] (a sum of operational and investment costs and computation of the so called transferred costs) also remains the same as in the other solution.

Cases where heat consumption in a limited area is high (industrial centers and towns, including trends, are known in individual locations in the CSSR) deserve special attention because in the future local heating with fossil fuels must be eliminated for ecological reasons, and due to current shortages of natural gas and crude oil the question arises how to deal with heat supply in relation to planned urban units.

At the first glance it is evident that if we are to utilize at the same time power coal for generation of heat, we cannot continue the hitherto tendency of a parallel development of the heat supply on the basis of gas, mazut, central heat, or electric power; furthermore, it is evident that reduction is necessary, and here centralized heat supply from a specific thermal density (MS/square km) is unequivocally advantageous.

Territorial Aspects of Heat Supply

Urbanization is one of the processes that must be given substantially more attention in the future, since it is a multifaceted social, economic, technical, and cultural phenomenon in the life of the contemporary world.

It may be said that the density of the population in the CSR is diffused as concerns housing, which reduces our economic efficiency. Labor productivity rises with the size of the form of settlement, and thus, urbanization serves as a reserve for a further efficient economic development. The process of urbanization may be included among the forms of the development of production forces; if it fails to progress fast enough, its lag in turn hampers the growth of economic efficiency.

The development of our existing industrial centers and of future urbanization and their needs must address itself in a more responsible way to heat supplies, location of heat sources, potential deliveries from the available resources, the distance of the CZT from such sources, the costs for the CZT, including generation of heat, the long-distance transport and secondary lines, the costs of natural gas and electric power supply, the costs for the improvement of additional factors of the infrastructure (sewage system, water, etc.).

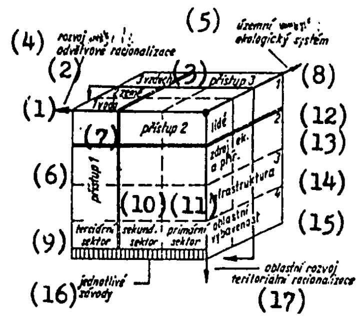
Reciprocal Problems in Branch, Regional and Territorial Planning

a) The branch economic plan safeguards the best possible development of operational programs of production in the primary, secondary and tertiary sphere. A major part of social activity is focused in that subsystem.

b) The regional plan for development represents a projection of the national economic plan into the space where it is especially necessary to respect spatial conditions for the introduction of developmental progress; to delineate the extent, and to organize the potential for utilization of natural and economic resources; to achieve the desirable inter-regional proportionality in employment, housing construction, public facilities, and supply to nonproduction services; to rationalize spatially the circulation of goods and products at the lowest possible costs for storage, handling, transportation of sales; to integrate in space the technological sequences of various types of production (complex); and to build rational infrastructure.

c) Territorial planning which correlates first of all interests and needs in the "Earth, Water, Air" ecological system in reflected by various restrictions.

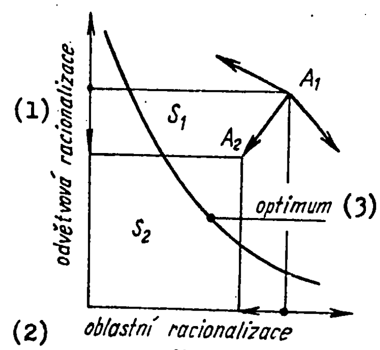
The supply of heat must consider all three basic aspects of planning; their optimization, as a demonstrable source of rationalization, not only saves primary resources, but also human labor, and maintains ecological conditions at a desirable level. Branch rationalization (in essence, reduced specific consumption of power) does not always have to agree with the requirements of territorial rationalization, as appears from the further discussion (for example, in considerations of the necessity to use low-grade fuels), as shown in Figures 2 and 3.



Obr. 2.
Vzájemné vztahy odvětvového, oblastního a územního plánování

Figure 2. Correlations in Branch, Regional and Territorial Planning

Key:
1 - Water
2 - Earth
3 - Air
4 - Development of branch rationalization
5 - Territorial ecologic system
6 - Approach 1
7 - Approach 2
8 - Approach 3
9 - Tertiary sector
10 - Secondary sector
11 - Primary sector
12 - People
13 - Ecological and natural source
14 - Infrastructure
15 - Regional facilities
16 - Individual plants
17 - Regional development - Territorial rationalization



Obr. 3.
Optimalizace odvětvového a oblastního programu a racionalizace v zásobování teplem

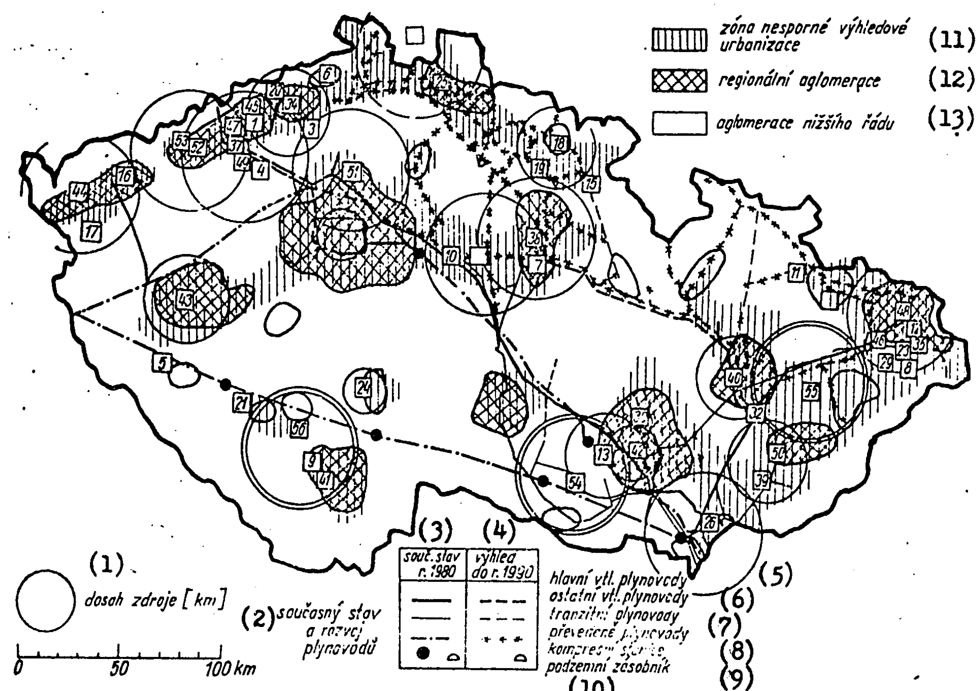
Figure 3. Optimization of Branch and Regional Programs and Rationalization of Heat Supply

Key:

1 - Branch rationalization
2 - Regional rationalization
3 - Optimum

Results of Study on Potential Heat Supply From the Czechoslovak Power Plants Concern in Conjunction With the Planned Urbanization Program for the CSR

The basic precondition here is a gradual transfer of the available power resources and the preparation of the planned power sources for combined generation of power and heat, with the application of the latest information and experience in long-distance transmission of heat. Figures 4 and 5 show the available opportunities (exploitation of the reserves and adaptation of the existing operations) and options made available as a result of the construction planned for the Seventh and Eighth Five-Year Plans. They express the potential for the supply to housing units within the reach of the presumed sources (average distance of small sources - 10 to 20 km, or large sources - 30 km), and furthermore, the increments and losses of electric capacities (the maximum, and the annual average) stemming from the envisaged shift from the current condensing electric power plants to thermal systems. To determine the extraction of heat from condensing power plants, reconstruction of turbines for extraction power plants is taken into consideration, with the maintenance of fully charged condensation, so that the installed capacity of the source is maintained (the maximum extraction, attainable by adaptation of turbines to back pressure, with continuously decreasing P_{inst} has not been taken into consideration). Extraction of heat from thermal plants was determined individually, according to the existing equipment in the thermal plant (passport), or according to the construction plan. Capacities nearing the end of their service life were included in the elaboration and deducted from total increments. Extraction of heat from nuclear sources under consideration is up to 50 percent (with potential 100 percent reserve).

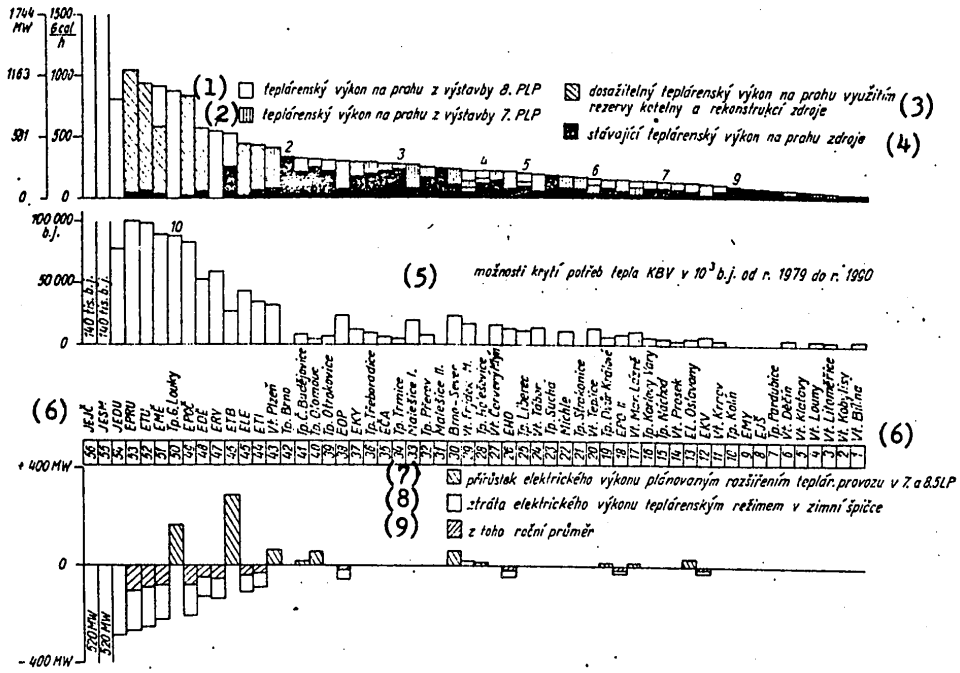


Obr. 4. Rozvoj centralizovaného zásobování teplem a výhledová urbanizace ČSR

Figure 4. Development of Centralized Heat Supply and Program of Urbanization of the CSR

Key:

1 - Access to source (km)
2 - Current situation and development of gas lines
3 - Current situation for 1980
4 - Outlook for 1990
5 - Main high-pressure gas lines
6 - Other high-pressure gas lines
7 - Transit gas lines
8 - Transferred gas lines
9 - Compressor plant
10 - Underground reservoir
11 - Zone of indisputable future urbanization
12 - Regional centers
13 - Low-order centers



Obr. 5. Vyjádření možnosti dodávky tepelného výkonu ze zdrojů koncernu ČEZ
1 - 800 t/h dožívá 1980, odběr tepla z bloku 2 × 250 MW (uveden), 2 - 260 t/h dožívá, 3 - 103 t/h dožívá, ve výsledku respektováno, 4 - 100 t/h dožívá 1983, ve výsledku respektováno, 5 - výstavba teplárny Li-Ja 320 t/h, 55 MW nezahrnuta, 6 - 40 t/h dožívá, respektováno, 7 - 116 t/h dožívá, respektováno, 8 - 390 t/h dožívá, respektováno, 9 - dožívá 1987, náhrada z EDĚ, 10 - uvedeno pro KBV, nutno počítat s průmyslem

Figure 5. Expression of Potential Delivery of Thermal Capacity from the Sources of the CEZ concern

1 - 800 t/h ending service life in 1980, extraction of heat from 2 x 250 MW unit (stated).

2 - 280 t/h ending service life.

3 - 103 t/h ending service life, included in the result.

4 - 100 t/h ending service life in 1983, included in the result.

5 - Construction of 320 t/h Li-Ja heat plant, 55 MW not included.

6 - 40 t/h ending service life, included

7 - 116 t/h ending service life, included.

8 - 390 t/h ending service life, included.

9 - Service life ending in 1987, replacement from the EDE.

10 - Stated for KBV; industry must be considered

Key:
1 - Threshold thermal capacity from the construction in the Eighth Five-Year Plan
2 - Threshold thermal capacity from the construction in the Seventh Five-Year Plan
3 - Threshold thermal capacity attainable by exploitation of reserves in boiler plants and conversion of the source
4 - Current threshold capacity of the source
5 - Potential satisfaction of the needs of heat in the KBV in 10^3 housing units from 1979 to 1990
6 - 1 - District heating plant in Bilina
2 - District heating plant in Kobylisy
3 - District heating plant in Litomerice
4 - District heating plant in Louny
5 - District heating plant in Klatovy
6 - District heating plant in Decin
7 - Heating plant in Pardubice
8 - Electric power plant in [Sluknov?]
9 - EMY
10 - Heating plant in Kolin
11 - District heating plant in Krnov
12 - EKV
13 - Power plant in Oslavany
14 - District heating plant in Prosek
15 - Heating plant in Nachod
16 - Heating plant in Karlovy Vary
17 - District heating plant in Marianske Lazne
18 - Electric Power Plants of Porici II
19 - Heating plant in Dvur Kralove
20 - District heating plant in Teplice
21 - Heating plant in Strakonice
22 - Michle
23 - Heating plant in Sucha
24 - District heating plant in Tabor
25 - Heating plant in Liberec
26 - EHO
27 - District heating plant in Cerveny Mlyn
28 - Heating plant in Holesovice
29 - District heating plant in Frydek-Mistek
30 - Brno North
31 - Malesice II
32 - Heating plant in Prerov

[Key continued)

33 - Malesice I
34 - Heating plant in Trmice
35 - ECA
36 - Heating plant in Treboradice
37 - EKY
38 - Electric Power Plant in Opatovice
39 - Heating plant in Otrokovice
40 - Heating plant in Olomouc
41 - Heating plant in Ceske Budejovice
42 - Heating plant in Brno
43 - District heating plant in Plzen
44 - Electric Power Plant in Tisova
45 - ELE
46 - ETB
47 - ERV
48 - EDE
49 - EPOC
50 - Heating plant in Louky
51 - Electric Power Plant in Melnik
52 - ETU
53 - EPRU
54 - Nuclear Power Plant in Dukovany
55 - JESM
56 - JEJC

7 - Increment of electric capacity by planned expansion of operations of thermal plants during the Seventh and Eighth Five-Year Plans
8 - Loss of electric capacity in the thermal system during the winter peak
9 - Of which annual average

Conclusions

1 - Presented in Figures 4 and 5 are areas where heat supplied by the CZT is unequivocally advantageous (high density of the thermal load MW/square km).

2 - The review further indicates where to focus gas, mazut, or electric power for heating and for a reduction of the amount of heat carriers, and where to cover two media (emergency supply).

3 - Available sources may be utilized in great many locations, particularly in power plants with 55, 110, and 200 MW units (see Figure 4). The zones indisputably designated for future urbanization programs are usually within the reach of the existing thermal sources and of the sources designated for the construction of the CEZ (with transmissions of heat up to 30 km).

4 - It is evident in which areas connections can be made for the consumers and where old sources may be disconnected or which sources should be converted for low-grade fuels.

5 - It is evident which structure of sources may be installed (approximate figures are presented--extraction is affected by parameters required for extracted heat, Table 3).

Tab. 3

(1) Rekonstrukce TG		(2) Nové odběrové TG		(3) Nové protitlaké TG	
(4) blok	(5) odběr tepla	(4) blok	(5) odběr tepla	(4) blok	(5) odběr tepla
(6) el. výkon	MW [Gcal/h]	(6) el. výkon	MW [Gcal/h]	(6) el. výkon	MW [Gcal/h]
50 MW	70 (60)	50 MW	110 (95	22 MW	140 (120)
110 MW	140 (120)	135 MW	186 (160)	50 MW	279 (240)
200 MW	256 (220)	300 MW	349 (300)		
500 MW	407 (350)				

Table 3.

Key:

1 - Converted [thermal generators]
2 - New extraction [thermal generators]
3 - New counter-pressure [thermal generators]
4 - Unit
5 - Heat extraction
6 - Electric capacity

6 - It is indicated where to deploy nuclear sources at the present time (for potential future utilization of heat).

7 - It is evident where new housing units should be constructed in view of the heat supply, and conversely, where in serious instances thermal sources have to be adapted to future urbanization programs (where other factors predominate over fuel-energy requirements). It should be said in this conjunction that unlike other methods of heat supply, the CZT positively and immediately advances urbanization to a higher standard.

8 - Potential utilization of low-grade fuel has become feasibly in additional localities where the CZT may prove even more effective (towns with population over 20,000) and where heat does not have to be generated, for instance, from natural gas.

9 - If the outlined objectives in the development of power engineering and of thermal engineering, including the unavoidable reconstruction and adaptation of the existing operations, are met prior to 1990, it may be possible to increase the threshold thermal capacities of the sources of the CEZ concern (excluding the nuclear sources) by thermal capacity of 11,737 MW, which in theory would facilitate the connection of more

than 1 million housing units (with some public facilities) in case of comprehensive housing construction within a reach of such sources. Similar preconditions have been met for about 80,000 housing units supplied by the nuclear power plant in Dukovany. This shift to thermal systems would mean a loss of 732 MW electric capacities during the winter peak, and about 144 MW on annual average (including increments of thermal capacities with 0.6 coefficient). The sum of threshold thermal capacities of the available thermal sources attainable by adaptation, conversion and planned construction prior to 1990, surpass by far the needs of comprehensive housing construction, which may be satisfied in every kraj (except for South Moravia and South Bohemia). Among the zones under consideration for unquestionable further urbanization programs and lesser centers, the needs of the following localities have not been covered from the sources of the CEZ concern: the Sluknov Panhandle, Turnov, Semily, Jihlava, Pribram, Horovice, Beroun, Sumperk, Zabreh, Usti nad Orlici, the southern part of the Capital City of Prague, the north-eastern part of Brno.

10 - Savings of labor:

on the basis of the facts ascertained for the past period (5 years) and of projections for the future, savings of 0.81 workers per 1 MW of the supplied thermal capacity may be anticipated in the CZT as compared with the supply from local boiler houses. In theory it is possible to save 11,737 x 0.81 = 9,506 workers. Potential savings of workers are calculated as the difference between the number of workers required for heat supply from local boiler houses and the needs in the projected increment of supplies from the SCZT. The savings are expressed by derivation from actual ratios of local boiler houses liquidated as a result of the introduction of district heating systems, on the basis of the KEP and VEP evidence, where the following applies:

Workers required for local boiler houses - 1,516 workers/MW thermal capacity;

In exchanger stations - 0.543 worker/MW thermal capacity;

For maintenance of the primary distribution system - 0.077 worker/MW thermal capacity;

Increment of service and maintenance workers in the source - 0.086 worker/MW thermal capacity.

11 - Savings of fuel

with the assumption that

- heating plants will be built in accordance with the proposal for the Seventh and Eighth Five-Year Plan, and that thermal capacity will be distributed and utilized by long-distance heat transmission and distribution systems;

- the existing condensing electric power plants will be converted into heating plants (with preservation of fully utilized condensations), which will result in an increment in the threshold thermal capacity in the amount of 11,737 MW thermal capacity;

- the output of 11,737 MW thermal capacity will be supplied for 3600 hours annually, so that electric power generated by steam in district heating plants will increase by approximately 6.10^6 MWh per year with a maximum of 0.15 tmp/MWh (specific fuel consumption).;

- the loss of electric capacity at the peak of 732 and 144 MW on the annual average will be compensated from other sources at 0.378/0.3792 tmp/MWh - 1.1×10^6 MWh represents fuel saved in the amount of about 2.5 million tmp/year.

The above consideration for the program for further proceedings in the solution of problems concerning the heat supply is based on detailed calculations made in conjunction with the preparations of projections for the period up to 1990.

Thus far, territorial relations and linkage in the development of power engineering and heat supply have not been systematically observed. As a result, the development was conceived with little consideration to the potential demand for heat in the future. So much more difficult appears at present the conversion of electric power plants to simultaneous generation of electric power and heat (conversion programs are motivated by some other reasons as well--reduction of specific fuel consumption, modernization of obsolete installations with 55, 110, and 200 MW units, conversion of installations for burning of low-grade fuels, etc.).

A very particular, and perhaps also the most relevant factor in territorial considerations at present is the necessary consideration of the future heat supply from nuclear sources, which requires prompt and well-planned construction of regional types of heat supply in such a way that the investments which are nonvariant for the type of the source (conventional, nuclear) with a prolonged schedule of construction must be launched immediately. Such a procedure is technologically feasible, advantageous in terms of economic efficiency, and unavoidable in view of the development of our society. The rational approach of the USSR as well as of other CEMA states may serve as an example, since there the share of electric power generated in a heating plant, and the share of the central heat supply are substantially higher than in the CSSR and the conversion of outmoded power plants into heating plants proceeds at a faster rate and to a greater extent, and generation of electric power and heat from high-grade fuels (gas, oil) comes under consideration only in isolated and exceptional cases (during the period of organization and construction of CZT centers)--to put it briefly, the solution of the target program is elaborated there to a far greater depth.

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